

Why Economists Cannot Predict the Past

Presented at Martin Perl's SET Seminar

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September 2007, updated: July 2022

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The Short and Simple Answer

Historical data report a range of different pasts, and recovering how the data were created is generally not possible.

- The data are revised on a periodic basis. Frequently a revision is larger in magnitude than the change from the previous value.
- Most macroeconomic data are determined on a “value” basis. i.e. the number of cars produced is determined by sales revenue divided by a guess at the average price of a car.

In any case, economic data are not reproducible.

The Short and Simple Answer, cont.

- Economic time series, sampled at an interval less than a year, are always “seasonally adjusted.” The purpose of this adjustment is to remove change which is due to the time of year (month or quarter). This leads to significant problems, including the fact that no seasonally adjusted macroeconomic datum is equal to the sum of its parts, since the data are summed and then seasonally adjusted.
- The summation (aggregation) that is done to produce macroeconomic data is based on assumptions and procedures that are not justifiable. In addition, the aggregation procedures are frequently changed.
- An accurate portrayal of a point in the past must include information concerning expectations at the time. These were typically not known at the time and cannot be “rediscovered” in a reliable way.

Economics and Science

Definitions:

- economics: the allocation of scarce resources in human populations. See Robbins [13]. This is, of necessity, a part of the evolution of man and society.
 - *normative*: deals with the various ism's about what *should* be. No more of that here.
 - *micro*: deals with *individual* economic units, such as individuals, firms,...
 - *macro*: deals with an economy as an aggregate system, such as a country or region, in terms of relationships between the aggregate variables such as GDP, employment, etc.
- *Input-Output Analysis*: representation of an economy by means of the relations between the inputs to each productive process and the resulting outputs.

Economics and Science, cont.

- *econometrics*: quantitative modeling of economic systems by means of (disaggregated) linear equation models, or (aggregated) differential equations.
- *Value*: The economic value of an “object” is the amount that a willing buyer will pay. This implies that value is a function of time and states of knowledge.
- *Liquidity*: a uniquely economic idea. It has no precise definition, but Keynes’ parable of the stones conveys the concept best.
- *cycles*: There is some evidence for cycles in national economies, but there are also cycles in economics in the sense that topics become popular in the literature, then fade away, and then return without any sign of progress, or prior reference. (Keynes made this comment.)

Economics and Science, cont.

- For example, when planning goes wrong, the “right” economic theory is free competition. When that goes wrong, the “right” economic theory is “interventionist” planning. Reproducible success has not been achieved.
- However, the idea of cycles derives from what may be termed “Newtonian Economics.” This is the belief that the laws of Classical Mechanics apply to economic systems. There is no empirical support for this belief, as again Keynes pointed out.
- Major contributions to Quantitative Economic Science were made, starting in the mid-1700’s, by François Quesnay, and in the mid-1800’s by Léon Walras [16]. These authors established a theory based on a system of linear equations as a description of the (Input/Output) functioning of an “economy.”

Economics and Science, cont.

- However, starting in the early 1900's, systems of differential equations in terms of the aggregate behavior of the economy were developed. This formulation came about as aggregate data (National Accounts) began to be produced by developed countries. Frequently the differential equations were copied directly from textbooks on Classical Mechanics. Implicitly, the laws of Newtonian Physics were applied to economic systems. The terms from mechanics were also used: velocity, acceleration, etc.
- By the inter-war period the practice of data collection by National agencies was sufficiently developed that economists began to attempt to estimate the coefficients of their equations using time-series of national accounts data.

Economics and Science, cont.

- The most prominent person who spoke out in opposition to this misuse of aggregate data was J. M. Keynes [7]. Basically, he said there is no empirical basis for the macro econometrics as pursued by, for example, Tinbergen at the League of Nations. The fact that, on this matter, no one seems to have listened to Keynes has led to much waste and confusion.
- The key reference on the accuracy of economic observations is Morgenstern [10], which is out of print. A useful reference on the state of economic theory is Morgenstern [9].

Technical and Theoretical Issues

Technical problems

- Typically there is no single authority for economic data collection. And, very little resource is allocated. If someone would provide official statisticians a modern hedge fund or FOREX trading desk we could have values for economic data on a continuous feed with at most a few minutes delay. Still unreliable, but quick.
- Most data are derived from samples. Sample size and composition changes from preliminary to final to revised data for a given data point, and all this changes from one time point to the next.

Technical and Theoretical Issues, cont.

- Seasonal Adjustment. Currently in the US this is done using a program (Census X11) which was developed in the late 1950's. The correlation between unadjusted and adjusted data is typically around 0.5, i.e. only about half of the variation is common to both series. It can be argued that only about half of the information in the unadjusted data is present in the adjusted data. Since moving averages are used, the most recent point must be extrapolated. Therefore, it contains even less information from the most recent recorded data points.

Theoretical Problems

- The nature and definition of the object being measured changes with time. Some changes are “natural” due to, for instance, the change in the age distribution of the population. Others are “administrative” due to changes in collection procedures and legal changes.
- There are basic differences between the “disaggregated” physical data needed for Input-Output analyses and the aggregated macroeconomic data used for National Accounts.

The BLS Monthly Employment Data

- Preliminary employment data for August were released on 7 Sept. 2007. The Dow Jones index fell 1.87%. Press reports suggested that the fall in the markets was a consequence of the reported employment data. However, it is not a simple matter to determine how or if these two events were connected.
- A Financial Times report on 8 Sept 2007 included the fact that the fall in August employment was 4,000. (All figures are rounded to nearest 1000.) The “expected” result was an increase of 110,000. The article also mentioned that the June and July employment figures were revised down by 81,000. Hank Paulson was quoted as commenting on the August figure: “Data does not always move in a straight line, so occasionally you will find some surprises. The economy will continue to grow in the second half of the year.”

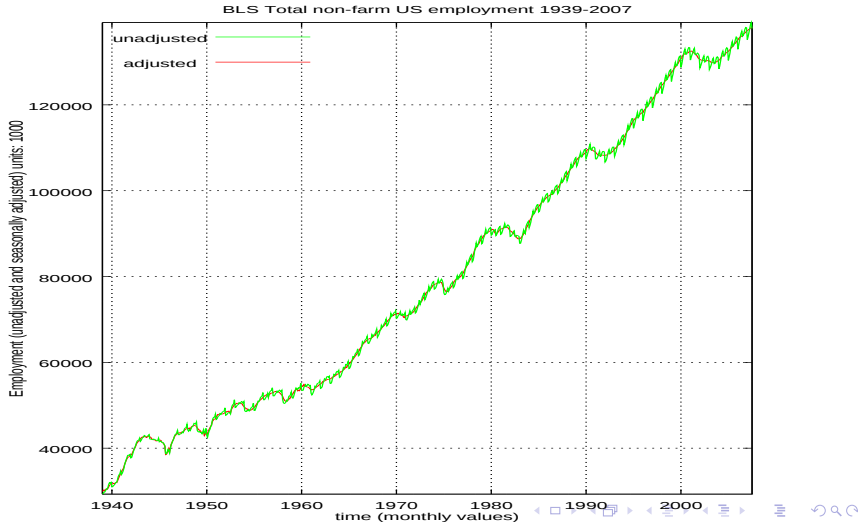
The BLS Monthly Employment Data

- The -81,000 number was computed from the BLS revisions data for June and July as reported on 7 Sept. Both of these are marked as “preliminary” in the BLS reports.
- June rev 3 - rev2 = -57k, July rev 2 - rev 1 = -24k, these sum to -81k.

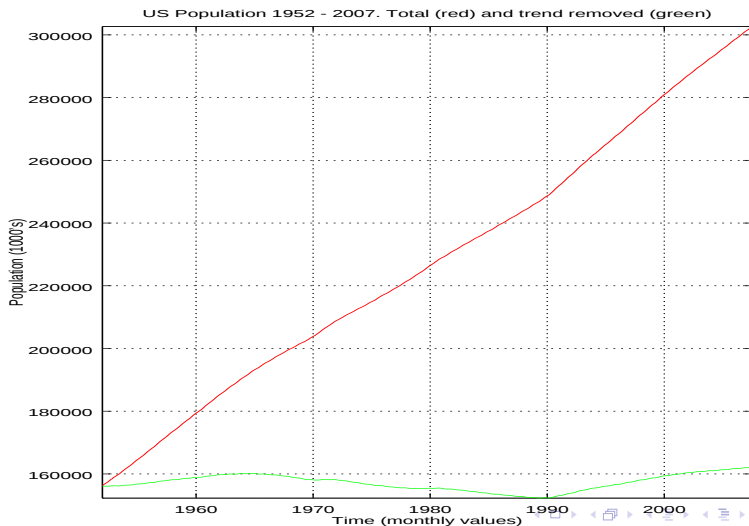
Date	Over-month change			Revision in month change		
	1st	2nd	3rd	(2nd-1st)	(3rd-2nd)	(3rd-1st)
Jun. 07	132k	126k	69k	-6k	-57k	-63k
Jul. 07	92k	68k		-24k		

Note that all of these revisions are larger in magnitude than the August value of -4,000.

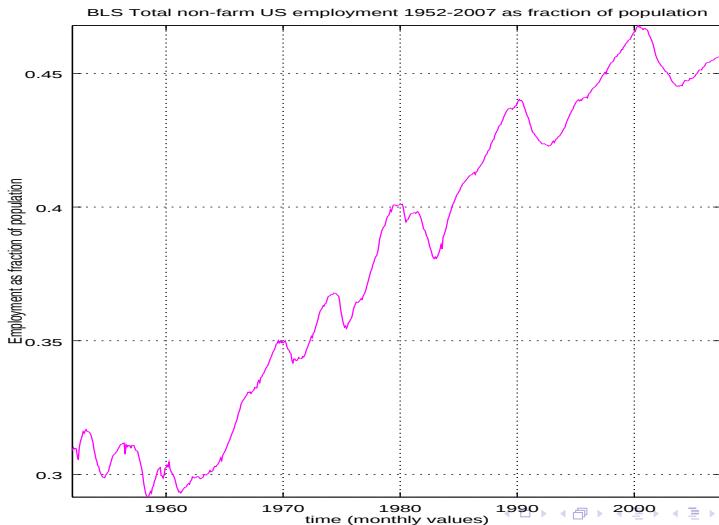
The BLS Monthly Employment Data



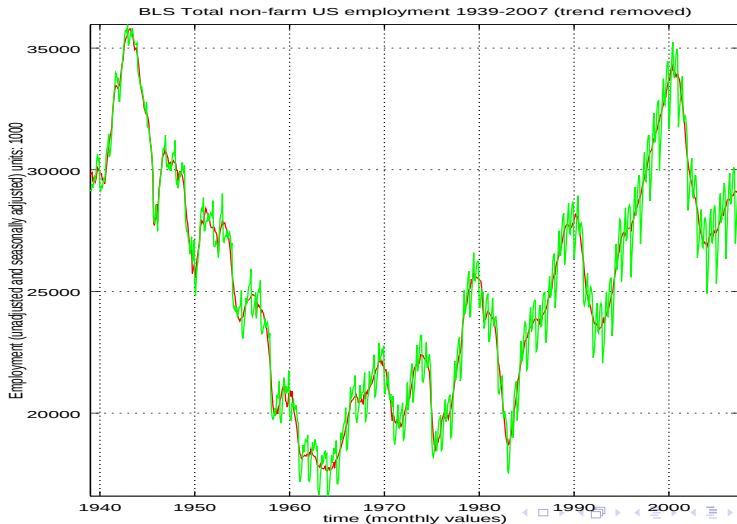
Population: total and trend removed



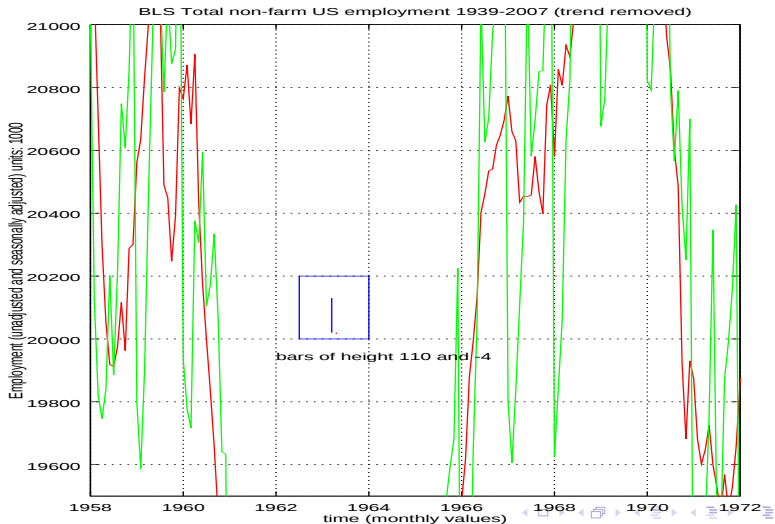
Employment: percent of population



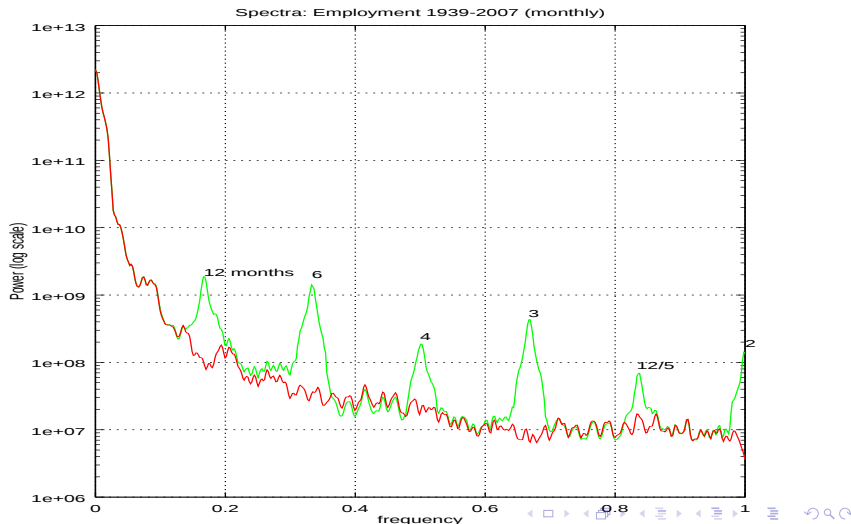
Employment Total Non-farm trend removed adj/unadj



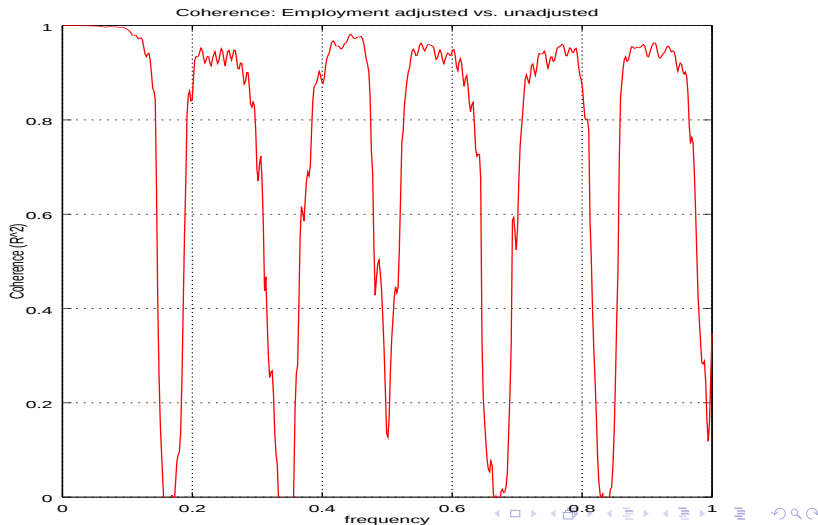
Total Non-farm trend removed adj/unadj



Power Spectra: Employment before/after adjustment



Coherence: employment adjusted vs. unadjusted



Employment Interpretation

- When a Company lays off workers its share price consistently goes up. But if the aggregate number of workers employed falls, the stock markets fall. The fall tends to be greater if the employment fall was “unexpected.”
- This is a hint that there is something odd about summation in economics.
- For example, on 19 Sept when Countrywide announced a 12,000 staff layoff (3 times the loss of employment in August) their share price rose as did the Dow Jones average.

Countrywide Share Price



Input-Output Analysis as an Alternative to Macroeconomics I

Dynamic Input-Output Models, due to von Neumann [14], and Kemeny, Morgenstern, Thompson [6], start with a simple formulation deriving directly from Quesnay and Walras:

There are 2 matrices, each m by n , the *input* matrix A and the *output* matrix B .

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \quad B = \begin{pmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ b_{m1} & b_{m2} & \dots & b_{mn} \end{pmatrix}.$$

Input-Output Analysis as an Alternative to Macroeconomics II

Each of the m rows is a distinct process, and each of the n columns is a distinct good needed (A) or produced (B) by the processes. There is a production time period (t). For each process, i , the input amount $a_{i,j}$ of the j th good must be supplied at the start of the period, and the amount $b_{i,j}$ of the j th good is produced at the end of the period. There is an *activity* vector, $x(1 \times m)$ such that x_i is the activity level of the i th process. And, there is a *price* variable $y(n \times 1)$ such that y_j is the value of the j th good. x and y are stochastic vectors ($x_i, y_j \geq 0$ and $\sum x_i, y_j = 1$). Thus the economy operates from time $(t-1)$ to time t as follows:

$$(xA)_{(t-1)} \rightarrow (xB)_t \quad \text{and} \quad (Ay)_{(t-1)} \rightarrow (By)_t$$

Input-Output Analysis as an Alternative to Macroeconomics III

For appropriate values of the coefficients, this system can be solved for the maximum expansion factor, α , and the interest factor, β . The solution values of x and y (x^* , y^*) are given by

$$\alpha = \beta = x^* B y^* / (x^* A y^*).$$

This formulation defines the physical production capability of an economic system. Formulations like this were used for production planning during World War II. This, of course, is an explanation for the subsequent loss of use: it is a planning tool. See additional references: Hatanaka [4] and Leontief [8].

The Problem of Summation

There are two fundamental theorems (See Nyblén [11]):

- *First Summation Theorem:*

Economic values are in general non-additive. Economic value is defined as the amount which a group of economic subjects can secure for themselves through collaboration. (von Neumann, Morgenstern [15]).

- *Second Summation Theorem:*

It is in general impossible to aggregate many individual value schemes to one social value scheme. By value scheme is meant a complete ordering of the various alternatives among which an economic subject may choose (Arrow [1]). This is the *Arrow Impossibility Theorem*.

The Problem of Summation, cont.

Key issues:

- Preferences: $A > B > C$, but $C > A$. Physical properties and economic properties are fundamentally different.
- Economic values depend on the state of knowledge about other economic entities and on time.
- In the physical world an observation affects the system being observed. In economics the threat of an observation affects the system, and the effect is different if the threat is repeated.
- Information is an economic good. Its value depends on who else knows it, and when and where it was learned.

For the silliest use of aggregation (after Bentham), see Friedman [3].

Life would be simpler if Bentham [2] and the *utilitarians* had been right.

Conclusions

- The theory problem: “Natural scientists make theories about things; social scientists make theories about things that make theories.” (Quote from Bill Janeway, of Warburg Pincus and Cambridge, in a recent email.)
- The measurement problem: The observer is observed by the observed.
- Substantially, all true statements in economics are tautologies. Economic theory based on “equilibrium” states is not directly useful for prediction since economic systems have no equilibrium.
- Measurement of individual preferences (*utility*) is possible, see Pfanzagl [12], but transitivity cannot be assumed.
- Aggregate economic data lack quantifiable meaning.
- The problem of summation in economics is fundamental, and has not been understood

Conclusions, cont.

- *Game Theory* as a characterization of economic behavior provides a possible resolution. (In any case, it is the only example where economics has given rise to new mathematics. The rest of mathematics used in economics is blindly copied differential equations and classical mechanics.)
- There appears to be practically no current interest in measurement or data quality in economics.
- There have been recent attempts, based on Game Theory, to carry out “experimental economics.” This has yet to have much effect. The economics profession does not seem to feel a need to base its subject on empirical evidence. See Hume [5].

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